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Claims:

1. A method of detecting double-talk and path changes in an echo cancellation system, comprising:

generating a correlation-based matrix of signals in said echo cancellation system;

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analyzing said correlation-based matrix to identify double-talk and path changes occurring in said system.

- 2. A method as claimed in claim 1, wherein said correlation-based matrix is generated using zero-lag auto and cross-correlations of said signals.
- 3. A method as claimed in claim 2, wherein a determinant of said matrix is used to detect said double-talk and path charges.
 - 4. A method as claimed in claim 3, wherein said double-talk and path changes are inferred when the value of said determinant passes predetermined threshold values.
 - 5. A method as claimed in claim 2, wherein eigendecompositions of said matrix are used to detect said double-talk and path changes.
 - 6. A method as claimed in claim 2, wherein single valued decompositions of said matrix are used to detect said double-talk and path changes.
 - 7. A method as claimed in claim 2, wherein condition numbers of said matrix are used to detect said double-talk and path changes.
- 20 8. A method as claimed in claim 1, wherein said echo cancellation system includes an adaptive filter, and said signals comprise an echo signal and an output of said adaptive filter.
 - 9. A method as claimed in claim 8, wherein said filter is an LMS filter.
- 10. A method as claimed in claim 9, wherein said LMS filter implements a normalized-LMS algorithm.
 - 11. A method as claimed in claim 1, wherein the elements of said correlation-based matrix are generated in the time domain.

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- 12. A method as claimed in claim 1, wherein the elements of said correlation-based matrix are generated in the frequency domain.
- 13. A method as claimed in claim 3, wherein said determinant R is of the form

$$\mathbb{R} = E \begin{bmatrix} X_0 X_0^T & X_0 X_1^T \\ X X_0^T & X_1 X_1^T \end{bmatrix}$$

- wherein $X_0[n]$ and $X_1[n]$ are generated by a linear combination of two real-valued source signals, $S_0[n]$ and $S_1[n]$.
 - 14. A method as claimed in claim 1, wherein $S_0[n]$ comprises an echo signal and $S_1[n]$ comprises a cancellation signal.
 - 15. A double-talk and path change detector, comprising:
 - a processing element generating a correlation-based matrix of signals in said echo cancellation system; and
 - a processing element for analyzing said correlation-based matrix to identify double-talk and path changes occurring in said system.
 - 16. A double-talk and path change detector as claimed in claim 15, wherein said correlation-based matrix is generated using zero-lag auto and cross-correlations of said signals.
 - 17. A double-talk and path change detector as claimed in claim 16, wherein a determinant of said matrix is used to detect said double-talk and path changes.
- 18. A double-talk and path change detector as claimed in claim 16, wherein said double-talk and path changes are inferred when the value of said determinant passes predetermined threshold values.
 - 19. A double-talk and path change detector as claimed in claim 16, wherein eigendecompositions of said matrix are used to detect said double-talk and path changes.
- 20. A double-talk and path change detector as claimed in claim 16, further comprising an adaptive filter, and said signals comprise an echo signal and an output of said adaptive filter.

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- 21. A double-talk and path change detector as claimed in claim 20, wherein said filter is an LMS filter.
- 22. A double-talk and path change detector as claimed in claim 17, wherein said determinant (R) is of the form

$$\mathbf{R} = E \begin{bmatrix} X_0 X_0^T & X_0 X_1^T \\ X_1 X_0^T & X_1 X_1^T \end{bmatrix}$$

wherein $X_0[n]$ and $X_1[n]$ are generated by a linear combination of two real-valued source signals, $S_0[n]$ and $S_1[n]$.